PATENT
Attorney Docket No. 215875

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Carl Saxinger

Application No. Unassigned

Filed: February 27, 2002

Art Unit: Unassigned

Examiner: Unassigned

For: POLYPEPTIDES THAT BIND HIV gp120 AND RELATED NUCLEIC ACIDS, ANTIBODIES, COMPOSITIONS, AND METHODS OF USE

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Prior to the examination of the above-identified patent application, please enter the following amendments and consider the following remarks.

AMENDMENTS

IN THE CLAIMS:

Please cancel claims 25-29, 32, 33, 37-49, 51 and 52.

Please replace the indicated claims with:

6. (Amended) The polypeptide of claim 1, which comprises the amino acid sequence YDIN*YYT*S*E, wherein N* is asparaginyl or a synthetic or naturally occurring substitute therefor, T* is threoninyl or a synthetic or naturally occurring substitute therefor, and S* is serinyl or a synthetic or naturally occurring substitute therefor.

8. (Amended) The polypeptide of claim 1, comprising the amino acid sequence M*D*YQ*V*S*SP*IYDIN*YYT*S*E, wherein each letter indicates the standard amino acid residue designated by that letter, and a letter followed directly by an * indicates that any synthetic or naturally occurring amino acid can occupy that position.

15. (Amended) The polypeptide of claim 11, which comprises the amino acid sequence M*EG*IS*IYT*S*D*NYT*E*E*, wherein each letter indicates the standard amino acid residue designated by that letter, and each letter followed directly by an * indicates the amino acid residue represented by the letter or a synthetic or naturally occurring conservative or neutral amino acid substitution therefor.

21. (Amended) A polypeptide comprising at least a portion or all of an amino acid sequence selected from the group consisting of LPPLYSLVFIFGFVGNML, QWDFGNTMCQLLTGLYFIGFFS, SQYQFWKNFQTLKIVILG, APYNIVLLLNTFQEFFGLNNCS, and YAFVGEKFRNYLLVFFQK, and, optionally, substituted with up to 6 conservative or neutral amino acid substitutions, wherein the polypeptide binds with HIV gp120 under physiological conditions and comprises less than about 100 amino acid residues that are identical to or substantially identical to the amino acid sequence of the human CCR5 chemokine receptor.

22. (Amended) A polypeptide comprising at least a portion or all of an amino acid sequence selected from the group consisting of LLLTIPDFIFANVSEADD (165-182), VVFQFQHIMVGLILPGIV (197-214), and IDSFILLEIIKQGCEFEN (261-278), and, optionally, substituted with up to 6 conservative or neutral amino acid substitutions, wherein the polypeptide binds with HIV gp120 under physiological conditions and comprises less than about 100 amino acid residues that are identical to or substantially identical to the amino acid sequence of the human CXCR4 chemokine receptor.

23. (Amended) A polypeptide comprising at least a portion or all of an amino acid sequence selected from the group consisting of LVISIFYHKLQSLTDVFL (53-70), PFWAYAGIHEWVFGQVMC (85-102), EAISTVVLATQMTLGFFL (185-202),

LTMIVCYSVIIKTLLHAG (205-222), MAVFLLTQMPFNLMKFIRSTHW (237-258), HWEYYAMTSFHYTIMVTE (257-274), ACLNPVLYAFVSLKFRKN (281-298) and SKTFSASHNVEATSMFQL (325-342), and, optionally, substituted with up to 6 conservative or neutral amino acid substitutions, wherein the polypeptide binds with HIV gp120 under physiological conditions and comprises less than about 100 amino acid residues that are identical to or substantially identical to the amino acid sequence of the human STRL33 chemokine receptor.

24. (Amended) A polypeptide comprising at least a portion of or all of an amino acid sequence selected from the group consisting of DTYICEVED, EEVQLLVFGLTANSD, THLLQGQSLTLTLES, and GEQVEFSFPLAFTVE, and, optionally, substituted with up to 6 conservative or neutral amino acid substitutions, wherein the polypeptide binds with HIV gp120 under physiological conditions and wherein the polypeptide comprises less than about 100 amino acids that are identical to or substantially identical to the amino acid sequence of the human CD4 cell-surface protein.

30. (Amended) A composition comprising the polypeptide of claim 1 and a carrier.

31. (Amended) A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 1, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

34. (Amended) A method of making an antibody, which method comprises administering an immunogenic amount of a polypeptide of claim 1 or a nucleic acid encoding the polypeptide to an animal.

35. (Amended) A method of inhibiting HIV infection in a mammal in need thereof, which method comprises administering to said mammal an effective amount of a polypeptide of claim 1, a nucleic acid encoding the polypeptide or an anti-antibody to the polypeptide.

36. (Amended) A method of making an antibody that binds to a gp120 envelope protein of a human immunodeficiency virus-1 (HIV-1), said method comprising:

(a) labeling a polypeptide of claim 1 to obtain a labeled compound,

(b) providing a library of synthetic peptides, wherein said library consists of a multiplicity of synthetically-produced polypeptides that are homologous to a continuous region of an HIV-1 gp120 envelope protein, wherein each polypeptide of said library is substantially isolated from every other polypeptide of said library and is located in a known position,

(c) individually contacting each polypeptide with said labeled compound such that a portion of the labeled compound can bind with the polypeptide, thereby producing a bound population of each polypeptide and an unbound population of each polypeptide,

(d) removing substantially all of the unbound labeled compound from the position occupied by each polypeptide,

(e) measuring the amount of labeled compound that remains co-localized with each polypeptide, to determine the quantity of labeled compound bound by each polypeptide,

(f) evaluating the amount of labeled compound bound by each polypeptide to identify a portion of the HIV-1 gp120 envelope protein that binds to an (HIV-1)-receptor selected from the group consisting of CCR5, CXCR4, STRL33, and CD4,

(g) providing an immunizing compound comprising a polypeptide comprising an amino acid sequence that is homologous to said portion of the HIV-1 gp120 envelope protein,

(h) inserting an immunogenic quantity of said immunizing compound into an animal to cause said animal to produce an antibody that binds with said portion of the HIV-1 gp120 envelope protein.

53. (Amended) The immunizing compound of step (g) of the method of claim 36.

54. (Amended) An antibody produced by the method of claim 36.

55. (Amended) A method of removing HIV from a bodily fluid of a mammal, which method comprises extra-corporeally contacting said bodily fluid with a solid support to which is attached a polypeptide of claim 1 or an anti-antibody to the polypeptide of claim 1.

Please add the following claims:

56. (New) The polypeptide of claim 5, which consists essentially of the amino acid sequence YDIN*YYT*S*E, wherein N* is asparaginyl or a synthetic or naturally occurring substitute therefor, T* is threoninyl or a synthetic or naturally occurring substitute therefor, and S* is serinyl or a synthetic or naturally occurring substitute therefor.

57. (New) The polypeptide of claim 56, wherein N* is asparaginyl, T* is threoninyl, and S* is serinyl.

58. (New) A composition comprising the polypeptide of claim 11 and a carrier.

59. (New) A composition comprising the polypeptide of claim 17 and a carrier.

60. (New) A composition comprising the polypeptide of claim 21 and a carrier.

61. (New) A composition comprising the polypeptide of claim 22 and a carrier.

62. (New) A composition comprising the polypeptide of claim 23 and a carrier.

63. (New) A composition comprising the polypeptide of claim 24 and a carrier.

64. (New) A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 11, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

65. (New) A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 17, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

66. (New) A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 21, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

67. (New) A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 22, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

68. (New) A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 23, wherein said nucleic acid can be expressed in a cell and,

optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

69. (New) A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 24, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

REMARKS

Claims 25-29, 32, 33, 37-49, 51 and 52 have been canceled to reduce the number of claims upon filing. In addition, claims 6, 8, 15, 21-24, 30, 31, 34-36 and 53-55 have been amended and claims 56-69 have been added to remove multiple claim dependencies. No new matter has been added by way of these amendments.

Conclusion

The application is considered to be in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

[signature]

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Art Unit: Unassigned

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AMENDMENTS TO SPECIFICATION, CLAIMS, AND ABSTRACT MADE VIA PRELIMINARY AMENDMENT

(Deletions are indicated by brackets,
while insertions are indicated by underlining)

Amendments to claims:

6. (Amended) The polypeptide of [any of claims 1-5] claim 1, which comprises the amino acid sequence YDIN*YYT*S*E, wherein N* is asparaginyl or a synthetic or naturally occurring substitute therefor, T* is threoninyl or a synthetic or naturally occurring substitute therefor, and S* is serinyl or a synthetic or naturally occurring substitute therefor.

8. (Amended) The polypeptide of [any of claims 1-6] claim 1, comprising the amino acid sequence M*D*YQ*V*S*SP*IYDIN*YYT*S*E, wherein each letter indicates the standard amino acid residue designated by that letter, and a letter followed directly by an * indicates that any synthetic or naturally occurring amino acid can occupy that position.

15. (Amended) The polypeptide of [any of claims 11-14] claim 11, which comprises the amino acid sequence M*EG*IS*IYT*S*D*NYT*E*E*, wherein each

letter indicates the standard amino acid residue designated by that letter, and each letter followed directly by an * indicates the amino acid residue represented by the letter or a synthetic or naturally occurring conservative or neutral amino acid substitution therefor.

21. (Amended) A polypeptide comprising at least a portion or all of an amino acid sequence selected from the group consisting of LPPLYSLVFIFGFVGNML, QWDFGNTMCQLLTGLYFIGFFS, SQYQFWKNFQTLKIVILG, APYNIVLLLNTFQEFFGLNNCS, and YAFVGEKFRNYLLVFFQK, and, optionally, substituted with up to 6 conservative or neutral amino acid substitutions, wherein the polypeptide binds with HIV gp120 under physiological conditions and comprises less than about 100 amino acid residues that are identical to or substantially identical to the amino acid sequence of the human CCR5 chemokine receptor.

22. (Amended) A polypeptide comprising at least a portion or all of an amino acid sequence selected from the group consisting of LLLTIPDFIFANVSEADD (165-182), VVFQFQHIMVGLILPGIV (197-214), and IDSFILLEIIKQGCEFEN (261-278), and, optionally, substituted with up to 6 conservative or neutral amino acid substitutions, wherein the polypeptide binds with HIV gp120 under physiological conditions and comprises less than about 100 amino acid residues that are identical to or substantially identical to the amino acid sequence of the human CXCR4 chemokine receptor.

23. (Amended) A polypeptide comprising at least a portion or all of an amino acid sequence selected from the group consisting of LVISIFYHKLQSLTDVFL (53-70), PFWAYAGIHEWVFGQVMC (85-102), EAISTVVLATQMTLGFFL (185-202), LTMIVCYSVIIKTLLHAG (205-222), MAVFLLTQMPFNLMKFIRSTHW (237-258), HWEYYAMTSFHYTIMVTE (257-274), ACLNPVLYAFVSLKFRKN (281-298) and SKTFSASHNVEATSMFQL (325-342), and, optionally, substituted with up to 6 conservative or neutral amino acid substitutions, wherein the polypeptide binds with HIV gp120 under physiological conditions and comprises less than about 100 amino acid residues that are identical to or substantially identical to the amino acid sequence of the human STRL33 chemokine receptor.

24. (Amended) A polypeptide comprising at least a portion of or all of an amino acid sequence selected from the group consisting of DTYICEVED, EEVQLLVFGLTANSD, THLLQGQSLTLTLES, and GEQVEFSFPLAFTVE, and, optionally, substituted with up to 6 conservative or neutral amino acid substitutions, wherein the polypeptide binds with HIV gp120 under physiological conditions and wherein the polypeptide comprises less than about 100 amino acids that are identical to or substantially identical to the amino acid sequence of the human CD4 cell-surface protein.

30. (Amended) A composition comprising the polypeptide of [any of claims 1-28,] claim 1 and a carrier.

31. (Amended) A nucleic acid, optionally in the form of a vector, encoding the polypeptide of [any of claims 1-28] claim 1, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

34. (Amended) A method of making an antibody, which method comprises administering an immunogenic amount of a polypeptide of [any of claims 1-28] claim 1 or a nucleic acid [encoding the polypeptide] encoding the polypeptide to an animal.

35. (Amended) A method of [prophylactically or therapeutically treating] inhibiting HIV infection in a mammal in need thereof, which method comprises administering to said mammal an effective amount of a polypeptide of [any of claims 1-28] claim 1, a nucleic acid [of any of claims 31-33,] encoding the polypeptide or an anti-antibody to [a] the polypeptide [of any of claims 1-28].

36. (Amended) A method of making an antibody that binds to a gp120 envelope protein of a human immunodeficiency virus-1 (HIV-1), said method comprising:

(a) labeling a polypeptide of [any of claims 1-28] claim1 to obtain a labeled compound,

(b) providing a library of synthetic peptides, wherein said library consists of a multiplicity of synthetically-produced polypeptides that are homologous to a continuous region of an HIV-1 gp120 envelope protein, wherein each polypeptide of said library is substantially isolated from every other polypeptide of said library and is located in a known position,

(c) individually contacting each polypeptide with said labeled compound such that a portion of the labeled compound can bind with the polypeptide, thereby producing a bound population of each polypeptide and an unbound population of each polypeptide,

(d) removing substantially all of the unbound labeled compound from the position occupied by each polypeptide,

(e) measuring the amount of labeled compound that remains co-localized with each polypeptide, to determine the quantity of labeled compound bound by each polypeptide,

(f) evaluating the amount of labeled compound bound by each polypeptide to identify a portion of the HIV-1 gp120 envelope protein that binds to an (HIV-1)-receptor selected from the group consisting of CCR5, CXCR4, STRL33, and CD4,

(g) providing an immunizing compound comprising a polypeptide comprising an amino acid sequence that is homologous to said portion of the HIV-1 gp120 envelope protein,

(h) inserting an immunogenic quantity of said immunizing compound into an animal to cause said animal to produce an antibody that binds with said portion of the HIV-1 gp120 envelope protein.

53. (Amended) The immunizing compound of step (g) of the method of [any of claims 36-52] claim 36.

54. (Amended) An antibody produced by the method of [any of claims 36-53] claim 36.

55. (Amended) A method of removing HIV from a bodily fluid of a mammal, which method comprises extra-corporeally contacting said bodily fluid with a solid support to which is attached a polypeptide of [any of claims 1-28] claim 1 or an anti-antibody to [a] the polypeptide of [any of claims 1-78, or the antibody of claim 54] claim 1.

56. (New) The polypeptide of claim 5, which consists essentially of the amino acid sequence YDIN*YYT*S*E, wherein N* is asparaginyl or a synthetic or naturally occurring substitute therefor, T* is threoninyl or a synthetic or naturally occurring substitute therefor, and S* is serinyl or a synthetic or naturally occurring substitute therefor.

57. (New) The polypeptide of claim 56, wherein N* is asparaginyl, T* is threoninyl, and S* is serinyl.

58. (New) A composition comprising the polypeptide of claim 11 and a carrier.

59. (New) A composition comprising the polypeptide of claim 17 and a carrier.

60. (New) A composition comprising the polypeptide of claim 21 and a carrier.

61. (New) A composition comprising the polypeptide of claim 22 and a carrier.

62. (New) A composition comprising the polypeptide of claim 23 and a carrier.

63. (New) A composition comprising the polypeptide of claim 24 and a carrier.

64. (New) A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 11, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence,

wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

65. (New) A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 17, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

66. (New) A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 21, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

67. (New) A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 22, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

68. (New) A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 23, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

69. (New) A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 24, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

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PENDING CLAIMS AFTER ENTRY OF PRELIMINARY AMENDMENT

1. A polypeptide comprising the amino acid sequence YDIXYYXXE, wherein X is any synthetic or naturally occurring amino acid residue, such that the polypeptide binds HIV gp120 under physiological conditions, and wherein said polypeptide comprises less than about 100 contiguous amino acids that are identical to or substantially identical to the amino acid sequence of the human CCR5 chemokine receptor.

2. The polypeptide of claim 1, which comprises less than about 50 contiguous amino acids that are identical to or substantially identical to the amino acid sequence of the human CCR5 chemokine receptor.

3. The polypeptide of claim 2, which comprises less than about 25 contiguous amino acids that are identical to or substantially identical to the amino acid sequence of the human CCR5 chemokine receptor.

4. The polypeptide of claim 3, which comprises less than about 13 amino acids that are identical to or substantially identical to the amino acid sequence of the human CCR5 chemokine receptor.

5. The polypeptide of claim 4, which consists essentially of YDIXYYXXE.

6. The polypeptide of claim 1, which comprises the amino acid sequence YDIN*YYT*S*E, wherein N* is asparaginyl or a synthetic or naturally occurring substitute therefor, T* is threoninyl or a synthetic or naturally occurring substitute therefor, and S* is serinyl or a synthetic or naturally occurring substitute therefor.

7. The polypeptide of claim 6, wherein N* is asparaginyl, T* is threoninyl, and S* is serinyl.

8. The polypeptide of claim 1, comprising the amino acid sequence M*D*YQ*V*S*SP*IYDIN*YYT*S*E, wherein each letter indicates the standard amino acid residue designated by that letter, and a letter followed directly by an * indicates that any synthetic or naturally occurring amino acid can occupy that position.

9. The polypeptide of claim 8, wherein said letter followed directly by an * indicates the amino acid residue represented by the letter or a synthetic or naturally occurring conservative or neutral amino acid substitution therefor.

10. The polypeptide of claim 9, wherein said amino acid sequence is MDYQVSSPIYDINYYTSE.

11. A polypeptide comprising the amino acid sequence XEXIXIYXXXNYXXX, wherein X is any synthetic or naturally occurring amino acid, such that the polypeptide binds HIV gp120 under physiological conditions, and wherein said polypeptide less than about 100 contiguous amino acids that are identical to or

substantially identical to the amino acid sequence of the human CXCR4 chemokine receptor.

12. The polypeptide of claim 11, which comprises less than about 50 contiguous amino acids that are identical to or substantially identical to the amino acid sequence of the human CXCR4 chemokine receptor.

13. The polypeptide of claim 11, which comprises less than 25 contigous amino acids that are identical to or substantially identical to the amino acid sequence of the human CXCR4 chemokine receptor.

14. The polypeptide of claim 13, which consists essentially of EXIXIYXXXNY.

15. The polypeptide of claim 11, which comprises the amino acid sequence M*EG*IS*IYT*S*D*NYT*E*E*, wherein each letter indicates the standard amino acid residue designated by that letter, and each letter followed directly by an * indicates the amino acid residue represented by the letter or a synthetic or naturally occurring conservative or neutral amino acid substitution therefor.

16. The polypeptide of claim 15, wherein said amino acid sequence M*EG*IS*IYT*S*D*NYT*E*E* is M*EGISIYTSDNYT*E*E*.

17. A polypeptide comprising the amino acid sequence EHQAFLQFS, such that the polypeptide binds with HIV gp120 under physiological conditions and wherein said polypeptide comprises less than about 100 contiguous amino acids that are identical to or substantially identical to the amino acid sequence of the human STRL33 chemokine receptor.

18. The polypeptide of claim 17, which comprises less than about 50 contiguous amino acid that are identical to or substantially identical to the amino acid sequence of the human STRL33 chemokine receptor.

19. The polypeptide of claim 18, which comprises less than about 25 contiguous amino acids that are identical to or substantially identical to the amino acid sequence of the human STRL33 chemokine receptor.

20. The polypeptide of claim 19, which consists essentially of the sequence EHQAFLQFS.

21. A polypeptide comprising at least a portion or all of an amino acid sequence selected from the group consisting of LPPLYSLVFIFGFVGNML, QWDFGNTMCQLLTGLYFIGFFS, SQYQFWKNFQTLKIVILG, APYNIVLLLNTFQEFFGLNNCS, and YAFVGEKFRNYLLVFFQK, and, optionally, substituted with up to 6 conservative or neutral amino acid substitutions, wherein the polypeptide binds with HIV gp120 under physiological conditions and comprises less than about 100 amino acid residues that are identical to or substantially identical to the amino acid sequence of the human CCR5 chemokine receptor.

22. A polypeptide comprising at least a portion or all of an amino acid sequence selected from the group consisting of LLLTIPDFIFANVSEADD (165-182), VVFQFQHIMVGLILPGIV (197-214), and IDSFILLEIIKQGCEFEN (261-278), and, optionally, substituted with up to 6 conservative or neutral amino acid substitutions, wherein the polypeptide binds with HIV gp120 under physiological conditions and comprises less than about 100 amino acid residues that are identical to or substantially identical to the amino acid sequence of the human CXCR4 chemokine receptor.

23. A polypeptide comprising at least a portion or all of an amino acid sequence selected from the group consisting of LVISIFYHKLQSLTDVFL (53-70), PFWAYAGIHEWVFGQVMC (85-102), EAISTVVLATQMTLGFFL (185-202),

LTMIVCYSVIIKTLLHAG (205-222), MAVFLLTQMPFNLMKFIRSTHW (237-258), HWEYYAMTSFHYTIMVTE (257-274), ACLNPVLYAFVSLKFRKN (281-298) and SKTFSASHNVEATSMFQL (325-342), and, optionally, substituted with up to 6 conservative or neutral amino acid substitutions, wherein the polypeptide binds with HIV gp120 under physiological conditions and comprises less than about 100 amino acid residues that are identical to or substantially identical to the amino acid sequence of the human STRL33 chemokine receptor.

24. A polypeptide comprising at least a portion of or all of an amino acid sequence selected from the group consisting of DTYICEVED, EEVQLLVFGLTANSD, THLLQGQSLTLTLES, and GEQVEFSFPLAFTVE, and, optionally, substituted with up to 6 conservative or neutral amino acid substitutions, wherein the polypeptide binds with HIV gp120 under physiological conditions and wherein the polypeptide comprises less than about 100 amino acids that are identical to or substantially identical to the amino acid sequence of the human CD4 cell-surface protein.

30. A composition comprising the polypeptide of claim 1 and a carrier.

31. A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 1, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

34. A method of making an antibody, which method comprises administering an immunogenic amount of a polypeptide of claim 1 or a nucleic acid encoding the polypeptide to an animal.

35. A method of inhibiting HIV infection in a mammal in need thereof, which method comprises administering to said mammal an effective amount of a polypeptide of claim 1, a nucleic acid encoding the polypeptide or an anti-antibody to the polypeptide.

36. A method of making an antibody that binds to a gp120 envelope protein of a human immunodeficiency virus-1 (HIV-1), said method comprising:

(a) labeling a polypeptide of claim 1 to obtain a labeled compound,

(b) providing a library of synthetic peptides, wherein said library consists of a multiplicity of synthetically-produced polypeptides that are homologous to a continuous region of an HIV-1 gp120 envelope protein, wherein each polypeptide of said library is substantially isolated from every other polypeptide of said library and is located in a known position,

(c) individually contacting each polypeptide with said labeled compound such that a portion of the labeled compound can bind with the polypeptide, thereby producing a bound population of each polypeptide and an unbound population of each polypeptide,

(d) removing substantially all of the unbound labeled compound from the position occupied by each polypeptide,

(e) measuring the amount of labeled compound that remains co-localized with each polypeptide, to determine the quantity of labeled compound bound by each polypeptide,

(f) evaluating the amount of labeled compound bound by each polypeptide to identify a portion of the HIV-1 gp120 envelope protein that binds to an (HIV-1)-receptor selected from the group consisting of CCR5, CXCR4, STRL33, and CD4,

(g) providing an immunizing compound comprising a polypeptide comprising an amino acid sequence that is homologous to said portion of the HIV-1 gp120 envelope protein,

(h) inserting an immunogenic quantity of said immunizing compound into an animal to cause said animal to produce an antibody that binds with said portion of the HIV-1 gp120 envelope protein.

50. The method of claim 36, wherein said step of removing substantially all of the unbound labeled compound comprises the additional steps of (i) removing a liquid containing said unbound labeled compound from a solid substrate to which an polypeptide of the library is bound, (ii) applying a quantity of wash-liquid to said solid substrate that is sufficient to cover any portion of said solid substrate or a vessel containing said solid substrate that has been contacted by said labeled compound, and (iii) removing said wash-liquid.

53. The immunizing compound of step (g) of the method of claim 36.

54. An antibody produced by the method of claim 36.

55. A method of removing HIV from a bodily fluid of a mammal, which method comprises extra-corporeally contacting said bodily fluid with a solid support to which is attached a polypeptide of claim 1 or an anti-antibody to the polypeptide of claim 1.

56. The polypeptide of claim 5, which consists essentially of the amino acid sequence YDIN*YYT*S*E, wherein N* is asparaginyl or a synthetic or naturally occurring substitute therefor, T* is threoninyl or a synthetic or naturally occurring substitute therefor, and S* is serinyl or a synthetic or naturally occurring substitute therefor.

57. The polypeptide of claim 56, wherein N* is asparaginyl, T* is threoninyl, and S* is serinyl.

58. A composition comprising the polypeptide of claim 11 and a carrier.

59. A composition comprising the polypeptide of claim 17 and a carrier.

60. A composition comprising the polypeptide of claim 21 and a carrier.

61. A composition comprising the polypeptide of claim 22 and a carrier.

62. A composition comprising the polypeptide of claim 23 and a carrier.

63. A composition comprising the polypeptide of claim 24 and a carrier.

64. A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 11, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

65. A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 17, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

66. A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 21, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

67. A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 22, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-

polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

68. A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 23, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.

69. A nucleic acid, optionally in the form of a vector, encoding the polypeptide of claim 24, wherein said nucleic acid can be expressed in a cell and, optionally, further comprising a nucleic acid sequence that encodes a signal sequence, wherein said signal sequence is translated as a fusion protein with the polypeptide to form a signal sequence-polypeptide fusion, and wherein said signal sequence can cause secretion of at least the polypeptide out of a cell in which the nucleic acid is expressed.